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THE ROLE OF THE FUNGICIDE PHOSPHITE TO CONTROL *PHYTOPHTHORA CINNAMOMI* IN NATIVE PLANT COMMUNITIES WITHIN OR ADJACENT TO MINING ACTIVITIES

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Background and objectives

Phytophthora cinnamomi is a major pathogen of native plant communities in Western Australia [1], where it affects approximately 14% of the northern jarrah (*Eucalyptus marginata*) forest [2] and over 2000 of the 9000 plant species in the *Banksia* woodlands and heathlands of the south-west of Western Australia [1]. Mining operations and timber harvesting are major activities in areas where *P. cinnamomi* is prevalent and its presence increases the financial costs associated with these activities. Hence, the development of a method to contain or eradicate the fungus will be a great financial advantage to mining companies. Fungicides have rarely been used to control diseases in native plant communities due to high cost and phytotoxic responses. However, recent research has shown that neutralized phosphorous acid (phosphite) has value in conserving rare and endangered plant species in the south-west of Western Australia [3]. This work examines the long-term efficacy of phosphite to control *P. cinnamomi* in a number of plant species when applied to foliar run-off over different seasons.

Materials and methods

A randomized experiment was set up in the jarrah forest located at the Alcoa of Australia Ltd - Huntly mine site near Dwellingup, Western Australia. Plant species belonging to families susceptible to *P. cinnamomi* were used, these included *Banksia grandis*, *Trymalium ledifolium*, *Lasiopetalum floribundum*, *Leucopogon verticillatus* and *Daviesia physodes*. Plant stems were under-bark inoculated by inserting a colonised Miracloth disc under a wound in the bark and sealing this with Parafilm to prevent desiccation. The fungicide Fosject 200 (phosphite) was applied to the plants using backpack spray units. Four concentrations 0, 0.5%, 1.0% and 2.0% phosphite plus 0.25% synertrol (wetting agent) were tested in Spring 1996 and Autumn 1997. Depending on the species, 7-10 plants per species were inoculated 1 week prior to spraying (inoculation 1). Inoculation 2 occurred 2 weeks after spraying, and inoculations 3, 4 and 5 were performed 6, 12 and 24 months after spraying, respectively. In each case, plants were harvested between 2 and 4 weeks after inoculation. At harvest, inoculated stems were removed. The upper portion of the stem from the inoculation point was cut into 1-cm segments and plated onto NARPH agar medium to determine lesion extension within the stem. In addition, plant tissue for each harvest was analysed by HPLC for phosphite and phosphate.

Results and conclusions

At the first harvest of the spring inoculation, there were no significant differences in lesion development between control and phosphite treatments for any species. At the second harvest (4 weeks after spraying, 2 weeks after inoculation 2), colonization by *P. cinnamomi* was greater in the control than in any of the phosphite treatments for all species, but *T. ledifolium*, *L. verticillatus* and *L. floribundum* were the only species which showed significant differences ($P<0.05$). This was caused by the large variation in lesion lengths between replicates. At harvest 3, although the plants sprayed with zero phosphite concentration had larger lesions for all species, only *D. physodes* showed significant differences between treatments, zero and 0.5% phosphite having larger lesions than the other concentrations. Preliminary results indicate that when phosphite is applied to plants in spring it does offer some control over *P. cinnamomi* colonization within the plant. More information will be gained from the inoculations after 12 and 24 months and the plants sprayed in autumn. Relationships between *in planta* phosphite concentrations and colonization by *P. cinnamomi* will be presented for each harvest and season of phosphite application.

References

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